



SEQUENCE LISTING

<110> Ehrhardt, Thomas
Lerchl, Jens
Nigel, Marc Stitt
Zenner, Rita

<120> Plant dihydroorotase

<130> 0050/50716

<140> US 10/070,277

<141> 2002-03-06

<150> PCT/EP00/08581

<151> 2000-09-02

<160> 9

<170> Microsoft Word 2003

<210> 1

<211> 1271

<212> DNA

<213> Solanum tuberosum

<220>

<221> CDS

<222> (9)..(1046)

<400> 1

```
ttgcaaaa atg gag ctc tca atc aca caa cct gat gat tgg cat ctt cat   50
      Met Glu Leu Ser Ile Thr Gln Pro Asp Asp Trp His Leu His
        1              5              10

ctc cgt gat ggt gat gtt ctt aag gca gtt gtc tct cac agt gca cat   98
Leu Arg Asp Gly Asp Val Leu Lys Ala Val Val Ser His Ser Ala His
15              20              25              30

cac ttt ggg agg gca ata gtc atg cca aat ttg aag cct cct atc act   146
His Phe Gly Arg Ala Ile Val Met Pro Asn Leu Lys Pro Pro Ile Thr
              35              40              45

acc act gct gct gct gta gca tac cgg gag gcg ata ttg aaa tct tta   194
Thr Thr Ala Ala Ala Val Ala Tyr Arg Glu Ala Ile Leu Lys Ser Leu
              50              55              60

cct gtt gat agt gat ttc aac cct ctt atg aca ctt tat ttg aca gat   242
Pro Val Asp Ser Asp Phe Asn Pro Leu Met Thr Leu Tyr Leu Thr Asp
              65              70              75

aca acc agt cct atg gaa atc aaa cta gca aga gag agc cag gtc gta   290
Thr Thr Ser Pro Met Glu Ile Lys Leu Ala Arg Glu Ser Gln Val Val
      80              85              90
```

ttt ggg gtg aag ttg tac cct gct ggt gcc acg aca aat tct caa gat	338
Phe Gly Val Lys Leu Tyr Pro Ala Gly Ala Thr Thr Asn Ser Gln Asp	
95 100 105 110	
gga gtg act gat ctt ttc ggg aag tgt tta cca gtt cta caa gaa atg	386
Gly Val Thr Asp Leu Phe Gly Lys Cys Leu Pro Val Leu Gln Glu Met	
115 120 125	
gtt gag cat aat atg cct ctg ctg gtt cat gga gag gtt act aat cct	434
Val Glu His Asn Met Pro Leu Leu Val His Gly Glu Val Thr Asn Pro	
130 135 140	
gag gtt gac atg ttt gat aga gaa aag gta ttc att gaa acg gtt cta	482
Glu Val Asp Met Phe Asp Arg Glu Lys Val Phe Ile Glu Thr Val Leu	
145 150 155	
aga ccg ttg gtg cag aaa ttt cca caa ttg aag gtc gtg atg gag cat	530
Arg Pro Leu Val Gln Lys Phe Pro Gln Leu Lys Val Val Met Glu His	
160 165 170	
gtt acc acc att gat gct gtt aag ttt gtt gaa tct tgc act gaa gga	578
Val Thr Thr Ile Asp Ala Val Lys Phe Val Glu Ser Cys Thr Glu Gly	
175 180 185 190	
ttt gtt gca gca act gtc acc cca caa cat ctt gtt ttg aac agg aat	626
Phe Val Ala Ala Thr Val Thr Pro Gln His Leu Val Leu Asn Arg Asn	
195 200 205	
tct ctc ttc caa ggg ggc tta caa ccg cat aat tac tgc ctt cca gtc	674
Ser Leu Phe Gln Gly Gly Leu Gln Pro His Asn Tyr Cys Leu Pro Val	
210 215 220	
ctc aaa aga gag atc cac agg gag gca ctt gtg tca gct gta aca agt	722
Leu Lys Arg Glu Ile His Arg Glu Ala Leu Val Ser Ala Val Thr Ser	
225 230 235	
gga agt aaa aga ttt ttt ctt ggg act gat agt gct cct cat gat aga	770
Gly Ser Lys Arg Phe Phe Leu Gly Thr Asp Ser Ala Pro His Asp Arg	
240 245 250	
cga aga aaa gag tgt tct tgt gga tgt gct ggt att tac aat gca cct	818
Arg Arg Lys Glu Cys Ser Cys Gly Cys Ala Gly Ile Tyr Asn Ala Pro	
255 260 265 270	
gta gcc ttg tca gta tat gcg aag gtg ttt gaa aag gaa aat gca ctc	866
Val Ala Leu Ser Val Tyr Ala Lys Val Phe Glu Lys Glu Asn Ala Leu	
275 280 285	
gac aag ctt gaa gca ttc act agc ttc aat gga cca gat ttt tat ggg	914
Asp Lys Leu Glu Ala Phe Thr Ser Phe Asn Gly Pro Asp Phe Tyr Gly	
290 295 300	
ctt cct agg aac aac tca aag att aag ttg agt aag acg cca tgg aag	962
Leu Pro Arg Asn Asn Ser Lys Ile Lys Leu Ser Lys Thr Pro Trp Lys	
305 310 315	
gta ccc gaa tcc ttt tct tat gca tca gga gat att att ccc atg ttt	1010
Val Pro Glu Ser Phe Ser Tyr Ala Ser Gly Asp Ile Ile Pro Met Phe	

320	325	330	
gct ggt gaa atg ctc gac tgg ttg ccg gct cct ctc tgagaatcat			1056
Ala Gly Glu Met Leu Asp Trp Leu Pro Ala Pro Leu			
335	340	345	
ttgtcattct tgtactgtaa tattgtgatt caaccaaaga tatagactgt aggtgtatca			1116
tcttttcttt catgttgatt agatattatc acgatgataa tatcctttca gctaataaat			1176
tatggaaaca ataagctttg cacgctcacc aaagtgtccc tgtattctga agttcttaaa			1236
ttgttcgttt gattttgaag atttactgat aaaaa			1271

<210> 2
 <211> 346
 <212> PRT
 <213> Solanum tuberosum

<400> 2

Met	Glu	Leu	Ser	Ile	Thr	Gln	Pro	Asp	Asp	Trp	His	Leu	His	Leu	Arg
1				5					10					15	
Asp	Gly	Asp	Val	Leu	Lys	Ala	Val	Val	Ser	His	Ser	Ala	His	His	Phe
			20					25					30		
Gly	Arg	Ala	Ile	Val	Met	Pro	Asn	Leu	Lys	Pro	Pro	Ile	Thr	Thr	Thr
		35					40					45			
Ala	Ala	Ala	Val	Ala	Tyr	Arg	Glu	Ala	Ile	Leu	Lys	Ser	Leu	Pro	Val
	50					55					60				
Asp	Ser	Asp	Phe	Asn	Pro	Leu	Met	Thr	Leu	Tyr	Leu	Thr	Asp	Thr	Thr
65				70						75					80
Ser	Pro	Met	Glu	Ile	Lys	Leu	Ala	Arg	Glu	Ser	Gln	Val	Val	Phe	Gly
				85					90					95	
Val	Lys	Leu	Tyr	Pro	Ala	Gly	Ala	Thr	Thr	Asn	Ser	Gln	Asp	Gly	Val
			100					105					110		
Thr	Asp	Leu	Phe	Gly	Lys	Cys	Leu	Pro	Val	Leu	Gln	Glu	Met	Val	Glu
		115					120					125			
His	Asn	Met	Pro	Leu	Leu	Val	His	Gly	Glu	Val	Thr	Asn	Pro	Glu	Val
		130				135					140				
Asp	Met	Phe	Asp	Arg	Glu	Lys	Val	Phe	Ile	Glu	Thr	Val	Leu	Arg	Pro
145					150					155					160
Leu	Val	Gln	Lys	Phe	Pro	Gln	Leu	Lys	Val	Val	Met	Glu	His	Val	Thr
				165					170					175	
Thr	Ile	Asp	Ala	Val	Lys	Phe	Val	Glu	Ser	Cys	Thr	Glu	Gly	Phe	Val
			180					185						190	

Ala Ala Thr Val Thr Pro Gln His Leu Val Leu Asn Arg Asn Ser Leu
195 200 205

Phe Gln Gly Gly Leu Gln Pro His Asn Tyr Cys Leu Pro Val Leu Lys
210 215 220

Arg Glu Ile His Arg Glu Ala Leu Val Ser Ala Val Thr Ser Gly Ser
225 230 235 240

Lys Arg Phe Phe Leu Gly Thr Asp Ser Ala Pro His Asp Arg Arg Arg
245 250 255

Lys Glu Cys Ser Cys Gly Cys Ala Gly Ile Tyr Asn Ala Pro Val Ala
260 265 270

Leu Ser Val Tyr Ala Lys Val Phe Glu Lys Glu Asn Ala Leu Asp Lys
275 280 285

Leu Glu Ala Phe Thr Ser Phe Asn Gly Pro Asp Phe Tyr Gly Leu Pro
290 295 300

Arg Asn Asn Ser Lys Ile Lys Leu Ser Lys Thr Pro Trp Lys Val Pro
305 310 315 320

Glu Ser Phe Ser Tyr Ala Ser Gly Asp Ile Ile Pro Met Phe Ala Gly
325 330 335

Glu Met Leu Asp Trp Leu Pro Ala Pro Leu
340 345

<210> 3
<211> 1962
<212> DNA
<213> Nicotiana tabacum

<220>
<221> CDS
<222> (305)..(1678)

<400> 3

gaattcggca cgagcacaaa agtagaaagg gttttgctct cccctttcat ctgtgtctca 60
taactgtgct aaaacctctc ccatcttccc tcaagaacaa agccacccca aaacaccacc 120
ttgtacactc ccattgtcgc ttccagtttt gtgccccaaa taaccttttc agtcatttgt 180
atcttagcat caacaacagt tgctgtctct cttttgttcg tccaatatac tgagcatttt 240
ttgagtagta atttgaaggg tttattcagt tgtaaatat ttgatttttg ttttgtttaa 300
gaaa atg aga caa agg gtt gga ttt gca ttg att aga gaa agc ttg tat 349
Met Arg Gln Arg Val Gly Phe Ala Leu Ile Arg Glu Ser Leu Tyr
1 5 10 15
cgt aag cta aaa cca agc tct gtt ccc aga cat tat tgc act tct tct 397
Arg Lys Leu Lys Pro Ser Ser Val Pro Arg His Tyr Cys Thr Ser Ser

	20	25	30	
tca gct aat gtt cct cct att cct cca cct aag att cct cat tct tct	35	40	45	445
Ser Ala Asn Val Pro Pro Ile Pro Pro Pro Lys Ile Pro His Ser Ser				
aaa aag gga agg ttg ttt aca gga gcc act att ggt cta cta ata gct	50	55	60	493
Lys Lys Gly Arg Leu Phe Thr Gly Ala Thr Ile Gly Leu Leu Ile Ala				
ggg gga gct tat gca agt acg gtt gat gag gcc acc ttc tgt ggc tgg	65	70	75	541
Gly Gly Ala Tyr Ala Ser Thr Val Asp Glu Ala Thr Phe Cys Gly Trp				
cta ttc tca gca aca aaa cta gta aat ccg ttc ttt gca ttt ctg gat	80	85	90	589
Leu Phe Ser Ala Thr Lys Leu Val Asn Pro Phe Phe Ala Phe Leu Asp				
cca gag gtt gct cac aaa ctg gcg gtc tct gct gca gcc cga gga tgg	100	105	110	637
Pro Glu Val Ala His Lys Leu Ala Val Ser Ala Ala Ala Arg Gly Trp				
gtt cca agg gag aag agg cca gat cct cct ata ttg ggc ctt gat gtg	115	120	125	685
Val Pro Arg Glu Lys Arg Pro Asp Pro Pro Ile Leu Gly Leu Asp Val				
tgg gga aga agg ttc tca aat cct gtt ggt ctt gct gct ggt ttt gac	130	135	140	733
Trp Gly Arg Arg Phe Ser Asn Pro Val Gly Leu Ala Ala Gly Phe Asp				
aag aat gct gag gct gtt gaa gga ttg ctt gga tta ggt ttt ggc ttt	145	150	155	781
Lys Asn Ala Glu Ala Val Glu Gly Leu Leu Gly Leu Gly Phe Gly Phe				
gtt gag gtt ggc tca gta act ccc att cca cag gaa ggc aac cca aaa	165	170	175	829
Val Glu Val Gly Ser Val Thr Pro Ile Pro Gln Glu Gly Asn Pro Lys				
cca cgt ata ttt agg ttg cca aat gaa ggt gct ata ata aat agg tgt	180	185	190	877
Pro Arg Ile Phe Arg Leu Pro Asn Glu Gly Ala Ile Ile Asn Arg Cys				
ggc ttc aat agt gaa gga atc gtt gtg gtt gcc aaa cga ttg ggt gct	195	200	205	925
Gly Phe Asn Ser Glu Gly Ile Val Val Val Ala Lys Arg Leu Gly Ala				
cag cat ggt aag aga aag ttg gaa aca tct agt act tca tct cca gct	210	215	220	973
Gln His Gly Lys Arg Lys Leu Glu Thr Ser Ser Thr Ser Ser Pro Ala				
gga gat gaa gtc aag cat gga ggg aaa gct ggt cct ggt att ctt ggt	225	230	235	1021
Gly Asp Glu Val Lys His Gly Gly Lys Ala Gly Pro Gly Ile Leu Gly				
gtt aac ctt gga aag aat aaa aca agt gaa gac gct gca gca gat tat	245	250	255	1069
Val Asn Leu Gly Lys Asn Lys Thr Ser Glu Asp Ala Ala Ala Asp Tyr				

[illegible]

aaaaaaaaaa aaaaaaaaga attc

1962

<210> 4

<211> 458

<212> PRT

<213> Nicotiana tabacum

<400> 4

Met	Arg	Gln	Arg	Val	Gly	Phe	Ala	Leu	Ile	Arg	Glu	Ser	Leu	Tyr	Arg	
1				5					10					15		
Lys	Leu	Lys	Pro	Ser	Ser	Val	Pro	Arg	His	Tyr	Cys	Thr	Ser	Ser	Ser	
			20					25					30			
Ala	Asn	Val	Pro	Pro	Ile	Pro	Pro	Pro	Lys	Ile	Pro	His	Ser	Ser	Lys	
		35					40					45				
Lys	Gly	Arg	Leu	Phe	Thr	Gly	Ala	Thr	Ile	Gly	Leu	Leu	Ile	Ala	Gly	
	50					55					60					
Gly	Ala	Tyr	Ala	Ser	Thr	Val	Asp	Glu	Ala	Thr	Phe	Cys	Gly	Trp	Leu	
65					70					75					80	
Phe	Ser	Ala	Thr	Lys	Leu	Val	Asn	Pro	Phe	Phe	Ala	Phe	Leu	Asp	Pro	
				85					90					95		
Glu	Val	Ala	His	Lys	Leu	Ala	Val	Ser	Ala	Ala	Ala	Arg	Gly	Trp	Val	
			100					105					110			
Pro	Arg	Glu	Lys	Arg	Pro	Asp	Pro	Pro	Ile	Leu	Gly	Leu	Asp	Val	Trp	
		115					120					125				
Gly	Arg	Arg	Phe	Ser	Asn	Pro	Val	Gly	Leu	Ala	Ala	Gly	Phe	Asp	Lys	
	130					135					140					
Asn	Ala	Glu	Ala	Val	Glu	Gly	Leu	Leu	Gly	Leu	Gly	Phe	Gly	Phe	Val	
145					150					155					160	
Glu	Val	Gly	Ser	Val	Thr	Pro	Ile	Pro	Gln	Glu	Gly	Asn	Pro	Lys	Pro	
				165					170					175		
Arg	Ile	Phe	Arg	Leu	Pro	Asn	Glu	Gly	Ala	Ile	Ile	Asn	Arg	Cys	Gly	
			180					185					190			
Phe	Asn	Ser	Glu	Gly	Ile	Val	Val	Val	Ala	Lys	Arg	Leu	Gly	Ala	Gln	
		195					200					205				
His	Gly	Lys	Arg	Lys	Leu	Glu	Thr	Ser	Ser	Thr	Ser	Ser	Pro	Ala	Gly	
	210					215					220					
Asp	Glu	Val	Lys	His	Gly	Gly	Lys	Ala	Gly	Pro	Gly	Ile	Leu	Gly	Val	
225					230				235					240		
Asn	Leu	Gly	Lys	Asn	Lys	Thr	Ser	Glu	Asp	Ala	Ala	Ala	Asp	Tyr	Val	
				245					250					255		

Gln Gly Val His Thr Leu Ser Gln Tyr Ala Asp Tyr Leu Val Ile Asn
 260 265 270
 Ile Ser Ser Pro Asn Thr Pro Gly Leu Arg Gln Leu Gln Gly Arg Lys
 275 280 285
 Gln Leu Lys Asp Leu Val Lys Lys Val Gln Ala Ala Arg Asp Glu Met
 290 295 300
 Gln Trp Gly Glu Glu Gly Pro Pro Pro Leu Leu Val Lys Ile Ala Pro
 305 310 315 320
 Asp Leu Ser Lys Gln Asp Leu Glu Asp Ile Ala Val Val Ala Val Ala
 325 330 335
 Leu Arg Val Asp Gly Leu Ile Ile Ser Asn Thr Thr Val Gln Arg Pro
 340 345 350
 Asp Ser Ile Ser Gln Asn Pro Val Ala Gln Glu Ala Gly Gly Leu Ser
 355 360 365
 Gly Lys Pro Leu Phe Asp Met Ser Thr Asn Ile Leu Lys Glu Met Tyr
 370 375 380
 Val Leu Thr Lys Gly Arg Ile Pro Leu Ile Gly Thr Gly Gly Ile Ser
 385 390 395 400
 Ser Gly Glu Asp Ala Tyr Lys Lys Ile Arg Ala Gly Ala Thr Leu Val
 405 410 415
 Gln Leu Tyr Thr Ala Phe Ala Tyr Gly Gly Pro Ala Leu Ile Pro Asp
 420 425 430
 Ile Lys Asp Glu Leu Ala Arg Cys Leu Glu Lys Asp Gly Tyr Lys Ser
 435 440 445
 Ile Ser Glu Ala Val Gly Ala Asp Cys Arg
 450 455

<210> 5
 <211> 15
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> by peptide synthesis

<400> 5

Leu Gly Thr Asp Ser Ala Pro His Asp Arg Arg Arg Lys Glu Cys
 1 5 10 15

<210> 6
 <211> 26
 <212> DNA
 <213> Artificial Sequence

<220>
<223> primer

<400> 6

aag gat ccg caa aaa tgg agc tct ca 26

<210> 7
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 7

aag gat cct cag aga gga gcc ggc aac 27

<210> 8
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 8
aag gat cca tgg ccg gaa ggg ctg 24

<210> 9
<211> 44
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 9

aag gat cct tag tgg tgg tgg tgg tgg tgt ttg tgg gat ggg gc 44